CLAIMS

1. A measurement device comprising:

a sensor having a probe section and configured and arranged to output a plurality of measurement signals, each of said plurality of measurement signals representing an effect of an energy field emanating from a source on said probe section at a corresponding one of a plurality of positional relationships between said probe section and said source in three dimensions;

a positioning device configured and arranged to controllably create said plurality of positional relationships; and

a processing unit configured and arranged to receive data based on the measurement signals and positional information related to the plurality of positional relationships and outputting a field characterization,

wherein the field characterization comprises a representation of a three-dimensional nature of the effect of the energy field on said probe section.

2. The measurement device according to claim 1, wherein the energy field is an electric field.

3. The measurement device according to claim 1, wherein the energy field is a magnetic field.

4. The measurement device according to claim 1, wherein the energy field is an thermal field.

5. The apparatus according to claim 1, one of the three dimensions being an orientation in a plane defined by the other two of the three dimensions.

6. The measurement device according to claim 5, wherein said sensor rotates about an axis perpendicular to a surface of the source.

7. The measurement device according to claim 1, said sensor comprising an active device.

8. The measurement device according to claim 1, wherein a brittle element extends between the probe section and a body of the sensor.

9. The measurement device according to claim 1, said probe section comprising two plates, wherein each of said plurality of data signals is derived from a capacitance between the plates.

10. The measurement device according to claim 1, said probe section comprising a ball, wherein a diameter of the ball is electrically small.

11. The measurement device according to claim 1, said sensor including at least one among a matching network, an amplifier, and a filter.

12. The measurement device according to claim 1, further comprising a registration unit configured and arranged to indicate an orientation of said sensor relative to the source.

13. The measurement device according to claim 12, said registration unit comprising a laser-emitting device.

14. The measurement device according to claim 1, wherein the processing unit is configured and arranged to compensate for predetermined aspects of a signal path between the probe section and the processing unit.

15. A method comprising:

controllably creating a plurality of positional relationships in three dimensions between a sensor and a source of a field, said sensor outputting a plurality of measurement signals corresponding to each of said plurality of positional relationships, each of said data signals being representative of an effect of the field on said sensor at a corresponding one of said plurality of positional relationships; and

processing the measurement signals from said sensor in combination with positional information related to said plurality of positional relationships to obtain a representation of a three-dimensional nature of the effect of the field on said sensor.

16. The method according to claim 15, wherein said sensor is a magnetic field sensor.

17. The method according to claim 15, wherein said sensor is an electric field sensor.

18. The method according to claim 15, wherein said sensor is a thermal sensor.

19. The method according to claim 15, wherein said sensor is an operating electronic device.

20. The method according to claim 15, one of the three dimensions being an orientation in a plane defined by the other two of the three dimensions.

21. The method according to claim 15, wherein a spectrum analyzer is used to process the data signals.

22. The method according to claim 15, wherein processing the data signals comprises compensating for predetermined aspects of a path over which the data signals are transmitted by said sensor.

23. A method of obtaining emissions data, said method comprising:

receiving a first measurement signal from a sensor, the first measurement signal being representative of an effect on the sensor of an electromagnetic field emitted by a device under test;

selecting a frequency at which a magnitude of the first measurement signal exceeds a predetermined threshold;

controllably creating a plurality of positional relationships between the sensor and the device under test;

for each among the plurality of positional relationships, receiving a second measurement signal representative of an effect on the sensor of an electromagnetic field emitted by the device under test; and

for each of the second measurement signals, determining a quality of the second measurement signal at the selected frequency.

24. The method of obtaining emissions data according to claim 23, wherein receiving a first measurement signal includes applying a transfer function of the sensor to the signal.

25. The method of obtaining emissions data according to claim 23, wherein receiving a second measurement signal includes applying a transfer function of the sensor to the signal.

26. The method of obtaining emissions data according to claim 23, wherein receiving a first measurement signal includes moving a scanning window of a spectrum analyzer across a predetermined frequency range.

27. The method of obtaining emissions data according to claim 23, wherein selecting a frequency includes determining the magnitude of the first measurement signal in a scanning window and moving the scanning window across a range of frequencies.

28. The method of obtaining emissions data according to claim 23, wherein determining a quality of the second measurement signal includes determining a spatial direction of the electromagnetic field.

29. The method of obtaining emissions data according to claim 23, wherein the electromagnetic field includes a magnetic field, and

wherein determining a quality of the second measurement signal includes determining a direction of the magnetic field.

30. The method of obtaining emissions data according to claim 23, wherein determining a quality of the second measurement signal includes determining a magnitude of the electromagnetic field.

31. The method of obtaining emissions data according to claim 23, wherein receiving at least one of a first and second measurement signal includes inputting an excitation signal to the device under test.

32. The method of obtaining emissions data according to claim 31, wherein receiving at least one of a first and second measurement signal includes varying a quality of the excitation signal.

33. The method of obtaining emissions data according to claim 32, wherein receiving at least one of a first second measurement signal includes varying a frequency of the excitation signal.

34. A method of obtaining emissions data, said method comprising:

controllably creating a plurality of positional relationships between a sensor and a source of a field;

receiving a plurality of measurement signals from the sensor, each measurement signal corresponding to a different one of the positional relationships and being representative of an effect of the field on the sensor at the corresponding positional relationship;

for each of the positional relationships, obtaining a data value from the corresponding data signal, the data value being based on a magnitude and a direction of a vector characterizing the field.

35. The method of obtaining emissions data according to claim 34, wherein the data values are based on components of a predetermined frequency.

36. The method of obtaining emissions data according to claim 34, wherein controllably creating a plurality of positional relationships includes rotating the sensor in relation to the source.

37. The method of obtaining emissions data according to claim 34, wherein controllably creating the plurality of positional relationships includes moving the sensor to a corresponding plurality of positions in a plane substantially parallel to a surface of the source.

38. The method of obtaining emissions data according to claim 34, wherein receiving a plurality of measurement signals includes applying a transfer function of the sensor to a signal received from the sensor.

39. The method of obtaining emissions data according to claim 38, wherein the transfer function of the sensor is a function of frequency.

40. The method of obtaining emissions data according to claim 38, further comprising calibrating the sensor using a reference field source to obtain the transfer function of the sensor.

41. The method of obtaining emissions data according to claim 34, wherein receiving a plurality of measurement signals includes compensating for cable losses in a signal received from the sensor.

42. The method of obtaining emissions data according to claim 34, wherein obtaining a data value includes inputting the corresponding data signal to a detector.

43. The method of obtaining emissions data according to claim 42, wherein the detector includes a tuned receiver.

44. A method of obtaining emissions data, said method comprising:

controllably creating a plurality of positional relationships between a sensor and a source of a field;

receiving a plurality of measurement signals from the sensor, each measurement signal corresponding to a different one of the positional relationships and being representative of an effect of the field on the sensor at the corresponding positional relationship;

for each of the positional relationships, obtaining a data value from the corresponding data signal; and

outputting a representation of the field in at least three dimensions based on the data values.

45. The method of obtaining emissions data according to claim 44, wherein each data value is associated with a position of the sensor in a predetermined plane, and

wherein each data value includes a magnitude and a direction of a vector characterizing the field at the corresponding position.

46. The method of obtaining emissions data according to claim 44, wherein outputting a representation of the field includes displaying the representation of the field.

47. The method of obtaining emissions data according to claim 46, wherein displaying the representation of the field includes displaying a false-color representation of the field.

48. The method of obtaining emissions data according to claim 46, wherein displaying the representation of the field includes displaying an image of at least one of the source and an outline of the source in tandem with the representation of the field.

49. The method of obtaining emissions data according to claim 48, wherein displaying the representation of the field includes displaying a correspondence between a point within the image of the source and a point within the representation of the field.

50. The method of obtaining emissions data according to claim 45, further comprising inputting an excitation signal to the source, wherein the field is based at least in part on the excitation signal.

51. The method of obtaining emissions data according to claim 50, wherein inputting an excitation signal to the source includes controlling at least one among a frequency and an amplitude of the excitation signal.

52. A method of obtaining susceptibility data, said method comprising:

positioning a source of a field in proximity to an electronic device;

varying a quality of the field;

receiving a plurality of data signals from the electronic device, each data signal corresponding to a different value of the quality of the field and being representative of an effect of the field on the electronic device.

53. The method of obtaining susceptibility data according to claim 52, wherein the source of the field comprises an antenna, and

wherein obtaining a corresponding data value comprises applying a transfer function of the antenna.

54. The method of obtaining susceptibility data according to claim 52, wherein positioning a source of a field comprises controllably moving the source in a predetermined path during said receiving a plurality of data signals.

55. The method of obtaining susceptibility data according to claim 52, wherein varying a quality of the field includes varying an intensity of the field.

56. The method of obtaining susceptibility data according to claim 52, wherein varying a quality of the field includes varying a frequency of the field.

57. The method of obtaining susceptibility data according to claim 52, wherein receiving a plurality of data signals comprises receiving data signals from a plurality of pins of the electronic device.

58. The method of obtaining susceptibility data according to claim 52, wherein each data signal is based on a voltage induced by the field.

59. The measurement device according to claim 1, said probe section comprising an active device.

60. The measurement device according to claim 8, wherein the brittle element comprises a glass tube.

61. The measurement device according to claim 8, wherein the brittle element encircles a portion of the signal path between the probe section and the body of the sensor.

62. The measurement device according to claim 12, wherein the registration unit comprises an imaging device.

63. The measurement device according to claim 1, wherein at least one of the positioning device and the processing unit includes a recognition

mechanism configured and arranged to determine a characteristic of the sensor.

64. The measurement device according to claim 1, wherein a signal path between the probe section and the processing unit includes a balanced transmission line.

65. The measurement device according to claim 1, wherein the signal path includes a twisted-pair line.

66. The measurement device according to claim 1, wherein a twist angle of the twisted-pair line varies from one end of the twisted-pair line to another.

67. The measurement device according to claim 1, wherein the sensor includes a conditioning circuit.

68. The measurement device according to claim 1, wherein the conditioning circuit includes a differential amplifier.

69. The measurement device according to claim 1, wherein the probe section includes an etched loop.

70. The measurement device according to claim 1, wherein the probe section includes etched plates.

71. The measurement device according to claim 1, wherein the probe section includes at least one microelectromechanical element.

72. The measurement device according to claim 1, wherein a signal path between the probe section and the processing unit includes a rotary connector.

73. The measurement device according to claim 1, wherein a signal path between the probe section and the processing unit includes a bias tee configured and arranged to receive a DC signal.

74. A method of measuring a vector field, said method comprising:

controllably creating a plurality of positional relationships in three dimensions between a sensor and a source of a field,

at each positional relationship, rotating the sensor with respect to the source and receiving a plurality of measurement signals, each of said measurement signals being representative of an effect of the field on said sensor at the positional relationship; and

for each positional relationship, processing the corresponding measurement signals to obtain a representation of a vector field emanating from the source.

75. The method of measuring a vector field according to claim 74, wherein the representation of a vector field includes a magnitude and direction of the vector field.

76. The method of measuring a vector field according to claim 74, wherein processing the corresponding measurement signals includes inputting data based on the measurement signals to a tuned receiver.

77. The method of measuring a vector field according to claim 76, wherein the tuned receiver comprises a spectrum analyzer.

78. The method of measuring a vector field according to claim 74, wherein rotating the sensor includes detecting a home position of the sensor.

79. The method of measuring a vector field according to claim 78, wherein processing the corresponding measurement signals includes sampling the corresponding measurement signals using an analog-to-digital converter, wherein a sampling operation of the analog-to-digital converter is synchronized with said detecting a home position of the sensor.

80. The method of obtaining emissions data according to claim 23, wherein receiving a measurement signal includes incrementing the span of a spectrum analyzer across a predetermined frequency range.

81. The method of obtaining emissions data according to claim 23, wherein selecting a frequency includes determining the magnitude of the measurement signal in a window and moving the window across a range of frequencies.

82. The method of obtaining emissions data according to claim 34, wherein receiving a plurality of measurement signals includes compensating for insertion losses in a signal received from the sensor.

83. The method of obtaining emissions data according to claim 42, wherein the detector includes one among a spectrum analyzer and an oscilloscope.

84. The method of obtaining susceptibility data according to claim 52, wherein receiving a plurality of data signals from the electronic device includes verifying a predetermined operation of the electronic device.

85. The measurement device according to claim 67, wherein a twist angle of a twisted-pair line between the probe section and the conditioning circuit is selected to match an impedance of at least one of the probe section and the conditioning circuit.